

**EARTH OBSERVING SYSTEM
GEOSCIENCE LASER ALTIMETER SYSTEM**

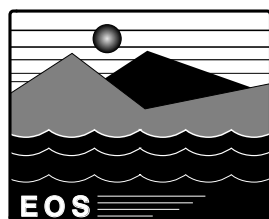
**GLAS Standard Data Products
Specification - Level 2**

Preliminary

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GLAS Science Team**



Foreword

This preliminary document defines the Level Two GLAS standard data products. This Standard Data Products Specification is developed under the structure of the NASA STD-2100-91, a NASA standard defining a four-volume set of documents to cover an entire software life cycle. Under this standard a section of any volume may, if necessary, be rolled out to its own separate document. This document is a roll out of the GLAS ESDIS Software Detailed Design Specification under the Product Specification Volume.

This document was prepared by the Observational Science Branch at NASA GSFC/WFF, Wallops Island, VA, in support of B. E. Schutz, GLAS Science Team Leader for the GLAS Investigation. This work was performed under the direction of David W. Hancock, III, who may be contacted at (804) 824-1238, hancock@osb1.wff.nasa.gov (e-mail), or (804) 824-1036 (FAX).

Items to be Resolved

- 1) Data product design will need to avoid data duplication, such as POD repeating for each parameter.
- 2) Refine the quality and use flags. Determine what is really required for data quality.
- 3) Determine clear definition of time, such as referenced to UTC or GPS, and time tagging (Level 2 products tagged to the mid point time?).
- 4) Understand and reflect the requirements for meteorological data.
- 5) For parameter 1014, Boundary Layer Heights, more definition is needed (are heights measured from the center of mass).
- 6) For parameter 2912, Ice Sheet Elevation, more definition is needed.
- 7) Is velocity needed in the coordinate data?
- 8) Is the geoid height needed on the data product?
- 9) Define meaningful data organization (file aggregation). For example, will pass number be useful to define the file aggregation?

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Preface

The GEOSCIENCE LASER ALTIMETER SYSTEM (GLAS) is a part of the EOS program. This laser altimetry mission will be carried on the spacecraft designated EOS LASER ALT. The GLAS laser is a frequency-doubled, cavity-pumped, solid state Nd:YAG laser.

This document addresses the data flow, interfaces, record and data formats associated with the GLAS Level 2 standard data products. The term "standard data products" refers to those EOS instrument data products listed in the Earth Science Data and Information System (ESDIS) Project data base that are routinely generated within the EOSDIS Core System (ECS) Distributed Active Archive Center (DAAC) or Science Computing Facilities (SCFs). Each data product has a unique Product Identification code assigned by the EOS Senior Project Scientist.

The Level 2 Standard Data Products specifically include those derived geophysical data values (i.e., ice sheet elevation, cloud height, vegetation height, etc.). Additionally, the appropriate correction elements used to transform the Level 1A and Level 1B Data Products into Level 2 Data Products are included. The data are packaged with time tags, precision orbit location coordinates, and data quality and usage flags.

Section 1

Introduction

1.1 Identification of Document

This document is identified as the GLAS Level 2 Standard Data Products Specification. The unique document identification number within the GLAS Ground Data System numbering scheme is GLAS-DPS-2641. Progressive editions of this document will be uniquely identified by the cover and page date marks.

1.2 Scope of Document

This document addresses the purpose, usage, and description of the GLAS Level 2 Standard Data Products. The intended audience for this document is the GLAS Science and Instrument Engineering Teams, the ESDIS Project and related focus teams, the community of EOS data users and investigators, and the GLAS Ground Data System Team.

1.3 Purpose and Objectives of Document

The purpose of the GLAS Level 2 Standard Data Products Specification is to provide a high-level descriptive document for the data products. This document describes the purpose, usage, content, and format of the GLAS Level 2 Data Products. It describes the representation and definition of the GLAS data elements constituting the data product. It further describes the structure, physical storage, organization, and access characteristics of the GLAS Level 2 Data Products. The document additionally describes file transfer methods to support product access, the data flow associated with the data product, and the data storage and generation characteristics of the data product.

1.4 Document Status and Schedule

The schedule defined in Table 1-1 "Document Delivery Schedule" lists the planned editions and updates for this document:

Table 1-1 Document Delivery Schedule

Edition/Revision Designation	Document Edition Description	Edition Delivery Focus	Activity Delivery Dates
DRAFT 1	incorporate revised EOSDIS terminology	Internal Review	December 1995
PRELIMINARY	revised document edition delivered to EOSDIS by GLAS Science Team Leader	EOSDIS, EOS	December 1995

1.5 Document Organization

This document outline is assembled in a form similar to those presented in the NASA Software Engineering Program [Applicable Document 2.3a]

Related Documentation

2.1 Parent Documents

The GLAS Level 2 Standard Data Products Specification is considered a "roll-out" from the Product Specification as the parent document or volume. Specific topics pertaining to data descriptions are located in the External Interface sections under the Detailed Design document template.

This document is subordinate to any top-level mission or instrument management plan documents, and as such, recognizes these documents as external parent documents in lineage. The recognized external EOSDIS and GLAS parent documents superior to the GLAS Level 2 Standard Data Products Specification are listed below.

- a) *EOS ALT/GLAS Mission Requirements Document*, Version 1.5, July 1993, Center for Space Research, University of Texas at Austin.
- b) *GLAS Science Software Development Management Plan*, Preliminary, December 31, 1995, NASA Goddard Space Flight Center, Wallops Flight Facility

2.2 Applicable Documents

The following documents are applicable to, or contain policies or references pertinent to the contents of the GLAS Level 2 Standard Data Products Specification.

- a) *Data Production Software, Data Management, and Flight Operations Working Agreement for GLAS*, TBD, NASA Goddard Space Flight Center.
- b) *GLAS EOSDIS Algorithm Theoretical Baseline Document*, TBD, NASA Goddard Space Flight Center.

2.3 Information Documents

The following documents are provided as sources of information that provide background or supplemental information that may clarify or amplify material in the GLAS Level 2 Standard Data Products Specification.

- a) *NASA Software Documentation Standard Software Engineering Program*, NASA, NASA-STD-21000-91, July 29, 1991.
- b) *The Geoscience Laser Altimetry/Ranging System*, IEEE Transactions on Geoscience and Remote Sensing, Vol. GE-25, No. 5, September 1987.
- c) *EOS Altimetry/GLAS Phase-A Study*, NASA Goddard Space Flight Center, November 1995.
- d) *Memorandum: GLAS Data Products*, Center for Space Research, University of Texas at Austin, December 23, 1993.

Purpose and Description of the Data Products

3.1 Purpose of the Data Products

The purpose of the GLAS Level 2 Standard Data Products is to provide time-ordered, processed GLAS data, acceptable for science applications and for generation of Level 3 and Level 4 Data Products. This GLAS derived data consists of calibrated laser altimeter data supplemented with precision orbit determination, earth-location and precision attitude data from the ancillary data sources. The GLAS Level 2 Standard Data Products are intended for use by the GLAS Science Team, and by the EOSDIS data user community.

3.2 Description of the Data Product

The GLAS Level 2 Standard Data Products are routinely generated by the ECS Operations Team. Table 3-1 “GLAS Level 2 Standard Data Products” identifies these Level 2 Data Products and shows the composition of each. Each Data Product consists of one or more specific EOS Data Parameters. The EOS Data Parameters are uniquely identified by their Parameter Number. Table 3-2 “GLAS Level 2 Standard Data Parameters” enumerates the EOS Data Parameters composing the Data Products. The contents of this table are in ascending order according to Product Identification, and include the EOS Parameter Name, the Parameter Number, i.e., the data product to which the parameter belongs, and the Number of Elements composing the Data Parameter.

Table 3-1 GLAS Level 2 Standard Data Products

Product ID (Identification)	Product Name	Product Level	Number of Parameters
GLA05	Aerosol Vertical Structure and Boundary Layer Height	2	7
GLA06	Cloud Height for Multiple Layers	2	1
GLA07	Ice Sheet Elevation and Roughness	2	2
GLA08	Sea Ice Roughness	2	2
GLA09	Thin Cloud/Aerosol Optical Depth	2	1
GLA10	Land Topography	2	1
GLA11	Vegetation Canopy Height	2	1

Each EOS Data Parameter is decomposable into one or more GLAS Data Elements. A GLAS Data Element is either an Item or an Arrays of Items as indicated in Table 3-3

“GLAS Level 2 Standard Data Elements”. The specific details of Table 3-3 assume an aggregation or assembly span of one-second. This table is ordered by the EOS Parameter Number and provides the Element Name, the number of Elements per Second, the size in number of Bytes per Item, the number of Items per Element, and the Total Bytes required for the element within the one-second aggregation. The Total Bytes in the GLAS Data Element for the aggregation period are obtained by the multiplication of the Elements per Second times the Bytes per Item times the Items per Element.

Table 3-2 GLAS Level 2 Standard Data Parameters

Product ID	Parameter Number	Parameter Name	Number of Elements
GLA05	2308	Aerosol Vertical Structure	1
GLA05	2308A	Cloud 1064 nm Backscatter Cross Section	9
GLA05	2308B	Aerosol Backscatter Cross Section	9
GLA05	2308C	Cloud Absorption Cross Section	4
GLA05	2308D	Aerosol Extinction Cross Section	3
GLA05	2308E	Cloud 532 nm Backscatter Cross Section	3
GLA05	1014	Boundary Layer Ht. Data	1
GLA06	1400	Cloud Ht. (Multi-layer)	8
GLA07	2912A	Ice_Sheet Elevation	7
GLA07	2912B	Ice_Sheet Roughness	3
GLA08	1554A	Sea Ice Roughness	12
GLA08	1554B	Sea Ice Elevation	3
GLA09	2291	Thin Cloud/Aerosol Opt. Depth	10
GLA10	2858	Land Topography	14
GLA11	3746	Vegetation Canopy Ht.	8

The EOS Data Parameters are geophysical data and associated correction values obtained from specific GLAS science algorithm sets. In addition to the EOS Data Parameters, the Data Products will have associated standard EOS Data Header Labels containing identification, processing history, and data content descriptive information.

The GLAS Level 2 Standard Data Products are generated as product aggregates or file (i.e., nominally a pass, a half orbit) of GLAS derived geophysical data. The data parameters represent derived geophysical data and associated correction values obtained from specific GLAS science algorithms. These data parameter groups include time tags, data use and quality flags, and precision orbit location data. In

addition to the data products, metadata including identification, processing history, and data content descriptive information is produced for archival.

Table 3-3 GLAS Level 2 Standard Data Elements

Parameter Number	Element Name	Elem /Sec	Bytes/ Item	Items/ Elem	Total Bytes
1014	Boundary Layer Height	5	4.00	1	20.00
1400	Cloud Bottom	5	4.00	1	20.00
1400	Cloud Top	5	4.00	1	20.00
1400	Cloud Height Quality Flag	1	8.00	5	40.00
1400	Cloud Height Use Flag	1	8.00	5	40.00
1400	Coordinate Data, POD, Sample Rate	5	8.00	3	120.00
1400	Orbit Number	1	2.00	1	2.00
1400	Time of First Sample	1	8.00	1	8.00
1400	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
1554A	Sea Ice Reflectivity Correction, Atmosphere	1	4.00	1	4.00
1554A	Sea Ice Reflectivity Correction, Calibration	1	4.00	1	4.00
1554A	Sea Ice Reflectivity Correction, Laser Pointing	40	4.00	1	160.00
1554A	Sea Ice Reflectivity Correction, Solar Angle	1	4.00	1	4.00
1554A	Sea Ice Surface Reflectivity	40	4.00	1	160.00
1554A	Coordinate Data, POD, Pulse Rate	40	8.00	3	960.00
1554A	Orbit Number	1	2.00	1	2.00
1554A	Time of First Pulse	1	8.00	1	8.00
1554A	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
1554A	Sea Ice Roughness	40	4.00	1	160.00
1554A	Sea Ice Roughness Use Flag	1	8.00	6	48.00
1554A	Sea Ice Roughness Quality Flag	1	8.00	6	48.00
1554B	Sea Ice Elevation	40	4.00	1	160.00
1554B	Sea Ice Elevation Quality Flag	1	8.00	6	48.00
1554B	Sea Ice Elevation Use Flag	1	8.00	6	48.00
2291	Cloud Optical Depth	5	4.00	1	20.00

Table 3-3 GLAS Level 2 Standard Data Elements (Continued)

Parameter Number	Element Name	Elem /Sec	Bytes/ Item	Items/ Elem	Total Bytes
2291	Coordinate Data, POD, Sample Rate	5	8.00	3	120.00
2291	Cloud Optical Depth Quality Flag	1	8.00	5	40.00
2291	Cloud Optical Depth Use Flag	1	8.00	5	40.00
2291	Orbit Number	1	2.00	1	2.00
2291	Time of First Sample	1	8.00	1	8.00
2291	Aerosol Optical Depth	5	4.00	1	20.00
2291	Aerosol Optical Depth Quality Flag	1	8.00	5	40.00
2291	Aerosol Optical Depth Use Flag	1	8.00	5	40.00
2291	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
2308	Aerosol Measurement	5	4.00	1	20.00
2308A	Cloud 1064 nm Backscatter Cross Section Quality Flag	1	8.00	5	40.00
2308A	Cloud 1064 nm Backscatter Cross Section Use Flag	1	8.00	5	40.00
2308A	Orbit Number	1	2.00	1	2.00
2308A	Time of First Pulse	1	8.00	1	8.00
2308A	Cloud 1064 nm Backscatter Cross Section Data	40	2.00	75	6000.00
2308A	Cloud 1064 nm Backscatter Cross Section Range	40	4.00	5	800.00
2308A	Cloud 1064 nm Backscatter Cross Section Horizontal Resolution	1	2.00	1	2.00
2308A	Coordinate Data, POD, Pulse Rate	40	8.00	3	960.00
2308A	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
2308B	Coordinate Data, POD, Sample Rate	5	8.00	3	120.00
2308B	Aerosol Backscatter Cross Section Data	5	2.00	550	5500.00
2308B	Aerosol Backscatter Cross Section Use Flag	1	8.00	5	40.00
2308B	Aerosol Backscatter Cross Section Quality Flag	1	8.00	5	40.00
2308B	Aerosol Backscatter Cross Section Range	5	4.00	10	200.00
2308B	Aerosol Backscatter Cross Section Horizontal Resolution	1	2.00	1	2.00

Table 3-3 GLAS Level 2 Standard Data Elements (Continued)

Parameter Number	Element Name	Elem /Sec	Bytes/ Item	Items/ Elem	Total Bytes
2308B	Orbit Number	1	2.00	1	2.00
2308B	Time of First Sample	1	8.00	1	8.00
2308B	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
2308C	Cloud Absorption Cross Section Data	5	4.00	200	4000.00
2308C	Cloud Absorption Cross Section Use Flag	1	8.00	5	40.00
2308C	Cloud Absorption Cross Section Quality Flag	1	8.00	5	40.00
2308C	Cloud Absorption Cross Section Range	5	4.00	1	20.00
2308D	Aerosol Extinction Cross Section Data	5	2.00	400	4000.00
2308D	Aerosol Extinction Cross Section Use Flag	1	8.00	5	40.00
2308D	Aerosol Extinction Cross Section Quality Flag	1	8.00	5	40.00
2308E	Cloud 532 nm Backscatter Cross Section Data	5	4.00	200	4000.00
2308E	Cloud 532 nm Backscatter Cross Section Quality Flag	1	8.00	5	40.00
2308E	Cloud 532 nm Backscatter Cross Section Use Flag	1	8.00	5	40.00
2858	Land Elevation Correction, Atmosphere	1	4.00	1	4.00
2858	Land Elevation Reflectivity Correction, Calibration	1	4.00	1	4.00
2858	Land Elevation Reflectivity Correction, Laser Pointing	40	4.00	1	160.00
2858	Land Elevation Reflectivity Correction, Retrack	1	4.00	1	4.00
2858	Land Elevation Reflectivity Correction, Solar Angle	1	4.00	1	4.00
2858	Land Elevation Surface Reflectivity	40	4.00	1	160.00
2858	Land Elevation Surface Roughness	40	4.00	1	160.00
2858	Time of First Pulse	1	4.00	1	4.00
2858	Land Elevation	40	4.00	1	160.00
2858	Coordinate Data, POD, Pulse Rate	40	8.00	3	960.00

Table 3-3 GLAS Level 2 Standard Data Elements (Continued)

Parameter Number	Element Name	Elem /Sec	Bytes/ Item	Items/ Elem	Total Bytes
2858	Land Elevation Quality Flag	1	8.00	6	48.00
2858	Land Elevation Use Flag	1	8.00	6	48.00
2858	Orbit Number	1	2.00	1	2.00
2858	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
2912A	Coordinate Data, POD, Pulse Rate	40	8.00	3	960.00
2912A	Ice Sheet Elevation Quality Flag	1	8.00	6	48.00
2912A	Ice Sheet Surface Elevation	40	4.00	1	160.00
2912A	Ice sheet Elevation Use Flag	1	8.00	6	48.00
2912A	Orbit Number	1	2.00	1	2.00
2912A	Time of First Pulse	1	8.00	1	8.00
2912A	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00
2912B	Ice Sheet Surface Roughness	40	4.00	1	160.00
2912B	Ice Sheet Roughness Quality Flag	1	8.00	6	48.00
2912B	Ice Sheet Roughness Use Flag	1	8.00	6	48.00
3746	Canopy Height	40	4.00	1	160.00
3746	Canopy Quality Flag	1	8.00	6	48.00
3746	Canopy Use Flag	1	8.00	6	48.00
3746	Vegetation Density	40	4.00	1	160.00
3746	Coordinate Data, POD, Pulse Rate	40	8.00	3	960.00
3746	Orbit Number	1	2.00	1	2.00
3746	Time of First Pulse	1	8.00	1	8.00
3746	Coordinate Data, POD, Quality Flag	1	4.00	1	4.00

The GLAS Level 2 Standard Data Products are produced by the GLAS EOSDIS Software System program based on the *GLAS Algorithm Theoretical Basis Document* [Applicable Document 2.2b]. These data products are produced from processing of GLAS Level 1A Data Products and GLAS Level 1B Data Products to form the Level 2 data. Figure 3-1 “GLAS Level 2 Products Within The Data Product Hierarchy” illustrates the source data products being processed to generate the Level 2 Data Products.

Section 4

Environment

4.1 Hardware Characteristics and Limitations

The GLAS Level 2 Standard Data Products will be generated on the UNIX host processors under the ECS DAAC. The required GLAS Level 1A and Level 1B Data Products are generated and reside in the ECS DAAC storage facilities. The ancillary GLAS Level 1B Data Product generated by the GLAS Science Team, is delivered to the ECS DAAC via the GLAS Science Computing Facility (SCF).

Newly-generated Level 2 Data Products in the ECS DAAC are accessed for quality assurance (QA) monitoring through the GLAS SCF. The GLAS SCF consists of ECS-compatible UNIX systems that interface to the EOSDIS External Network, and support the GLAS Science Team operations including the quality monitoring. The GLAS Level 2 Data Products and the QA monitoring data are installed in the ECS DAAC archive. The Level 2 associated data description and support information are stored in the ECS DAAC to facilitate EOS client inquiry and retrieval activities. The distribution management function of the ECS DAAC allows clients to perform direct search and access of the Level 2 data or to request preparation of Level 2 Data Products.

Figure 4-1 “GLAS Level 2 Data Products Flow Within the ECS DAAC and SCF Architecture” provides a block diagram of the relationship of the GLAS Level 2 Standard Data Products to the DAAC and the Science Computing Facility.

4.2 Data Product Medium and Characteristics

The Data Products will be archived under the Logical or Super Data Collections within the ECS DAAC. The storage system will contain not only the Level 2 Data Products, but will also contain data descriptions and data advertisements (i.e., textual descriptive and abstract information also called metadata). The Level 2 Data Products will be part of the Earth Sciences Data Types collection while the ancillary information describing and documenting the data products will be a part of the Computer Science Data Types collection.

The Earth Science data are implemented in the current EOSDIS system through a hierarchical storage manager interface. Physical media supported by the storage system interface will include the disk storage subsystems, magnetic or optical media subsystems, and tiered archive robotics storage subsystems. The ECS DAAC hierarchical storage arrangement consists of two functional subsystems: 1) the data repository subsystem, and 2) the working storage subsystem. Clients can directly access the GLAS Level 2 data from the storage system and can copy the data products to their host processors across the EOSDIS Internal or External Networks.

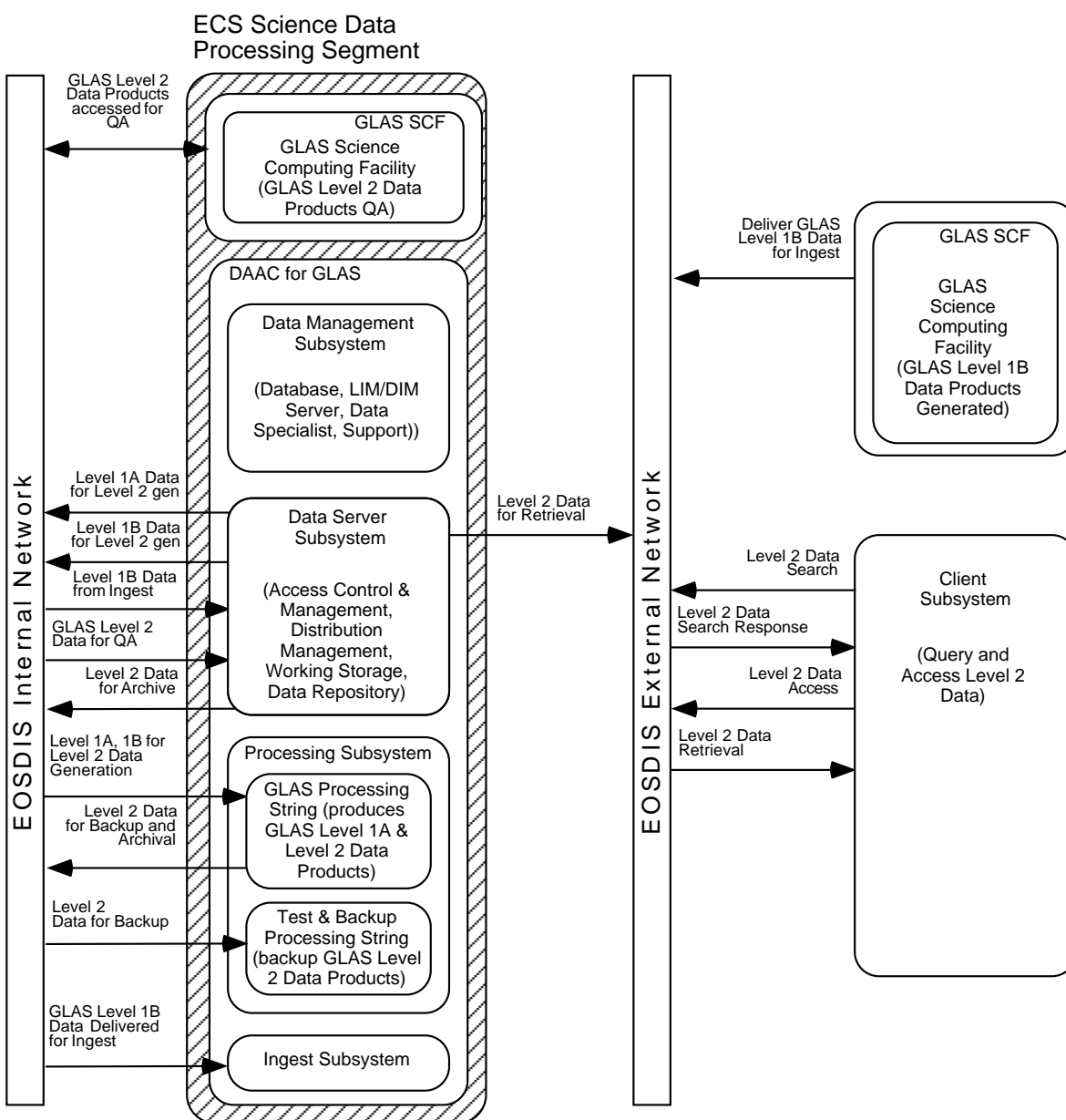


Figure 4-1 GLAS Level 2 Data Products Flow Within the ECS DAAC and SCF Architecture

4.3 Protocol and Conventions

The ECS DAAC facilities consist of distributed UNIX-based operating system-based computers. At the core of the DAAC architecture will be the file structures, operating system protocols, input/output protocols, device addressing, and data representation inherent in the standard UNIX environment. These UNIX protocols and conven-

tions will be removed from direct access by ECS staff and client users through the subsystem applications, COTS packages, data managers, and data handlers installed on the DAAC subsystem components. The visible conventions and protocols then become those of the Algorithm Development Libraries and the Computer Science Data Type Libraries provided to support the Data Ingest, Data Server, Processing, Planning, Interoperability, Data Management, and Client Subsystems of the DAAC architecture.

EOS and EOSDIS specific protocols and conventions will be documented in the appropriate Project documentation. Specific topics for these documents are expected to be traceability notation, metadata, keyword/value conventions, file and record structure, EOF notation, markers, and label structure and content. Device addressing and input/output protocols will be presented in the Project documentation describing the specification and use of the EOSDIS supplied libraries (toolkits).

Data definition terminology specific to the GLAS Level 2 Data Products and this document is presented in the Glossary at the end of this document. Figure 4-2 "UNIX Data Representation" depicts a schematic of the standard UNIX data representations used in GLAS Level 2 Data Products. These data structures will be used in the Section 6.0 generic data description and in the Appendix C detailed data description of the GLAS Level 2 Data Product contents.

4.4 Failure Protection, Detection, and Recovery Features

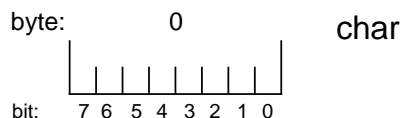
GLAS Level 2 Data Products failure protection, detection, and recovery will be primarily functions of the ECS Operations Team. The generated GLAS Level 2 Data Products will be "backed up" under the functions performed by the ECS DAAC. In the event of failure or error detection in the active working or archive storage containing GLAS Level 2 data at a Local Information Manager site, recovery would be performed from backup media.

Initial GLAS Level 2 Data Products error detection is performed as part of the product quality assurance activity. The generated GLAS Level 2 Data Products are evaluated at the GLAS Science Computing Facility. Media failure, data drop-out, checksum errors, and data integrity checks will be reported as part of the routine ECS function. Should the need arise, GLAS ground data system support personnel will be available to assist ECS data specialists and product support personnel in determining the nature of an internal GLAS Level 2 Data Products problem.

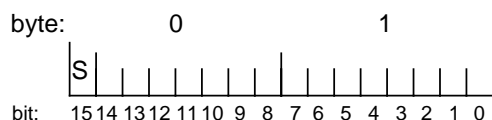
The security and integrity of the GLAS Level 2 Data Products will be protected by the working storage and archive schema of the ECS DAAC data server subsystem, and through the access and data management protocols established by the various EOSDIS and client data handling tools.

Data Types, Sizes, and Representations

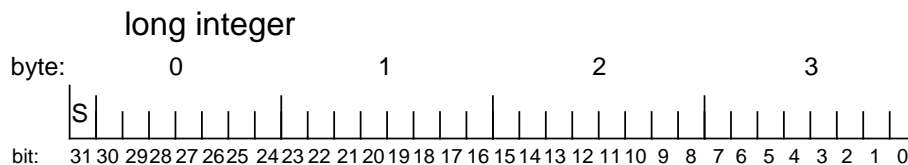
Conventions: byte 0 is the most significant byte (MSB)
 bit 0 is the least significant bit (lsb)
 S = the sign bit



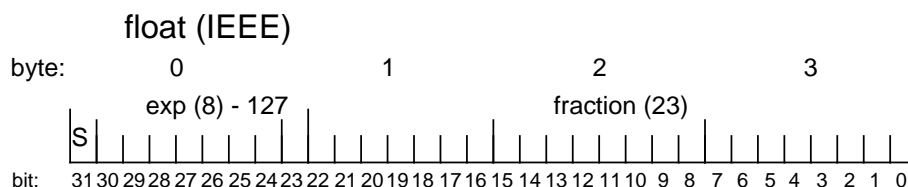
minimum value = 0
 maximum value = 255



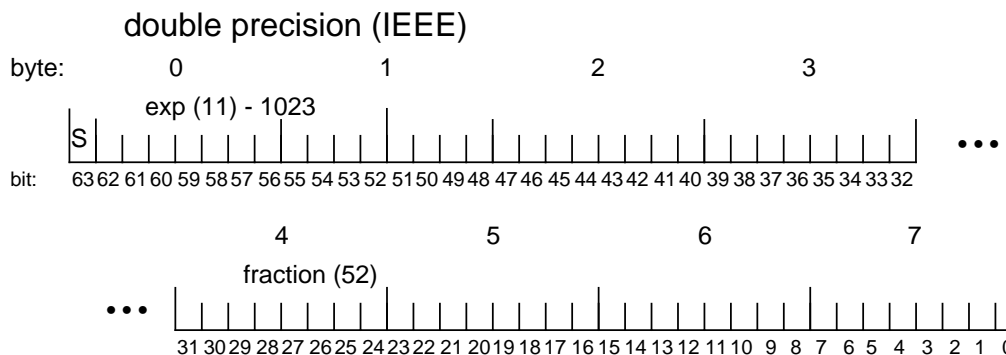
minimum value = -32768
 maximum value = 32767



minimum value = -2147483648
 maximum value = 2147483647



minimum value = $-3.40282347 \times 10^{38}$
 maximum value = $+3.40282347 \times 10^{38}$



minimum value = $-1.189731495357231765 \times 10^{4932}$
 maximum value = $+1.189731495357231765 \times 10^{4932}$

Figure 4-2 UNIX Data Representation

Data Flow Characteristics

5.1 Volume, Size, and Frequency Estimates

The expected daily data burdens for the GLAS Level 2 Standard Data Products are listed in Table 5-1 “GLAS Level 2 Data Product Daily Storage Burden”. These estimates are based on the following EOS LASER ALT operational assumptions. The spacecraft will orbit the Earth at an inclination of 94 degrees and a nominal altitude of 705 kilometers in a circular orbit. The orbit (groundtrack) repeat cycle is one-half year based on a frozen orbit. The EOS LASER ALT orbit period will be approximately 100 minutes, with a pass period duration of approximately 50 minutes (the granule collection period).

Table 5-1 GLAS Level 2 Data Product Daily Storage Burden

Product ID	Volume (MBytes per Day)
GLA05	2252.62
GLA06	21.95
GLA07	128.39
GLA08	157.08
GLA09	28.86
GLA10	148.78
GLA11	120.10

5.2 Data Transfer and Transmission

The majority of data transfers within the architecture involving the GLAS Level 2 Standard Data Products will utilize the internal part of the EOS Science Network. The Ethernet network access arrangement will be based on the TCP/IP (or other) protocols and performed using UNIX command operations, or will use tools implemented under the ECS DAAC. GLAS Level 2 Data Products generated within the ECS DAAC will be transferred to the DAAC Test and Backup String for fail-safe functions and to the GLAS Science Team for product assurance support across the EOS Internal Network. GLAS Level 2 Data Products approved for archive installation and client access are also delivered to the ECS DAAC using the EOS Internal Network. These transfer operations are internal to the DAAC maintenance and operations activities.

Data access by EOS clientele for the purpose of retrieving GLAS Level 2 Standard Data Products primarily uses the EOS External Network portion of the EOS Science Network. EOS clients will electronically retrieve the GLAS Level 2 data using UNIX network support commands or specialized tools supplying the data retrieval capability. Alternately, the client may request media preparation for off-line delivery rather than the electronically transferred data. The client can request the preparation of magnetic or magneto-optical media containing the selected data products through the Data Server's Distribution Management facility.

5.3 Timing and Sequencing Characteristics

The GLAS Level 2 Standard Data Products are generated as product files consisting of a pass of processed GLAS Level 1A and Level 1B Standard Data Products data. The basic aggregation of the GLAS Level 2 Data Products is the EOS Data Parameters and GLAS Data Elements in the data record. Each record consists of one-second of GLAS instrument-reduced geophysical and ancillary data. The data parameters contained within the record are groups of forty hertz, five hertz, and one hertz data. The data record will be identified by time tags referenced to the first forty hertz laser pulse height vector, and the first five hertz aerosol measurement (sample).

All data records within the GLAS Level 2 data granules will be in ascending time order based on the height vector (first pulse) or aerosol measurement (first sample) time tag. All parameters contained within the record are synchronous at either forty hertz, five hertz, or one hertz. The GLAS Level 2 Data Product granule will contain one pass of GLAS instrument geophysical and ancillary data. The pass will be either the northern hemisphere portion or the southern hemisphere portion of the EOS LASER ALT orbit as recorded from equator crossing to equator crossing.

The GLAS instrument and the EOS LASER ALT spacecraft are expected to operate continuously over the five-year life. Therefore, each pass of the EOS LASER ALT spacecraft is expected to generate a pass of GLAS Level 2 products data. Operating at this rate, ECS is expected to produce an average of 29 passes of GLAS Level 2 Data Products per day.

5.4 Recipients and Utilization

The intended recipients for the GLAS Level 2 Data Products are the scientific, governmental, and educational community sectors. The initial recipients of the GLAS Level 2 Data Products will be the GLAS Science Team and the GLAS Ground Data System Operations Team charged with product quality assurance monitoring. The GLAS Science and GDS Operations Team will perform data quality evaluation and statistical reporting on the GLAS Level 2 Data Products to quantify and qualify the products for EOS community usage.

5.5 Access

While EOS is intended to be a globally available and utilized mission program, access to the data is still operated under a security and integrity program to protect the data and data system resources from unauthorized or destructive use. EOS has identified three classes of users who will have access to the data through the DAAC; these are 1) SCF users, 2) other scientists, and 3) guest users. These users will be enrolled under EOSDIS and receive individual access and authorization details under the Communications and Systems Management Segment security role. Users who are authorized EOS access can then avail themselves of the EOS services to retrieve GLAS Level 2 Data Products as well as to query the advertising and data description information from the data base management server.

Data Products Definitions

6.1 Data Products Structure

The GLAS Level 2 Standard Data Products will be generated as an EOSDIS applied standard header label and an associated data product file, i.e., the collection of one-second records of GLAS instrument geophysical and ancillary data. The GLAS data records are collected as a granule, such that the data product file encompasses the period of the source EOS LASER ALT spacecraft pass. Within the one-second data record aggregate, data are collected in EOS data parameter groups.

The EOS Data Parameters as shown in Table 3-2 “GLAS Level 2 Standard Data Parameters” are further subdivided into the GLAS Data Elements identified in Table 3-3 “GLAS Level 2 Standard Data Elements”. The data elements consist of measured or derived data values collected at the forty, five, or one hertz rate, and one of more items or arrays collected at that frequency. The data rate times the number of items establishes the total number of data items for a particular GLAS Data Element recorded in each one-second data record.

6.2 Labeling and Identification

Each of the GLAS Level 2 Data Products is uniquely identified by a hierarchical data format (HDF) compliant file name. The form of this file name is

[filename example placeholder]

where [description of the subfields in the EOSDIS filename string placeholder].

The structure and contents of the EOSDIS standard product label linked to each of the GLAS Level 2 Data Products are contained in Appendix A, GLAS Level 2 Data Products -- EOSDIS Standard Label -- Contents and Description. Within the standard product label, the following keyword/value fields uniquely identify the GLAS Level 2 Data Product.

- Instrument Name
- Product Creation Time
- Generating Algorithm Name
- Generating Algorithm Identification
- EOS LASER ALT Orbit Number
- EOS LASER ALT Pass Number
- Equator Crossing Time
- Equator Crossing Longitude
- First Data Point Time (First Laser Pulse or Sample Time)

- Last Data Point Time (Last Laser Pulse or Sample Time)

Discrete terminology has been applied to identify particular EOS Data Parameters and GLAS Data Elements as to the origin of the value within the GLAS instrument. The 1064 nanometer (nm) prefix has been attached to those elements associated with the instrument infrared (IR) spectrum wavelength. Alternately, this has been identified as the λ_1 wavelength and is occasionally referred to as the altimeter associated measurement. The 532 nm prefix has been attached to those GLAS data elements associated with the green spectrum. Alternately, this has been identified as the λ_2 wavelength and is occasionally referred to as the LIDAR associated measurement.

6.3 Data Products Substructure Descriptions

The EOSDIS standard data product label and headers contain an aggregate of [TBD] fixed length (=TBD bytes) records of string information describing the GLAS Level 2 Data Products. Appendix A provides the format of the standard label and headers, including the keyword/value field contents.

The GLAS Level 2 Data Products file is linked to the EOSDIS standard product label and headers file. Each aggregate or record consists of the time tag, the GLAS instrument-derived, computed geophysical parameters, the data use and quality flags, and the associated earth location ancillary data, as recorded, fitted, averaged, or derived at the forty hertz, five hertz, or one hertz rate. The specific layout, format, and content of the GLAS Level 2 Data Product record are provided in Appendix B, GLAS Level 2 Data Products -- Format.

6.4 Detailed Data Descriptions

The detailed information describing the GLAS Level 2 Data Products comprising the data elements and the contents of the one second data record collections is provided as a data dictionary in Appendix C, GLAS Level 2 Data Products -- Detailed Data Contents and Description.

The terms and explanations listed in Table 6-1 "GLAS Terms and Explanations" are provided as a road map for the detailed descriptions presented in Appendix C.

Table 6-1 GLAS Terms and Explanations

Data Detail Field	Explanation
Element Name	the GLAS Data Element name, describes the unique GLAS item, items, or array as a member of the GLAS Data Parameter collection
Product Identification	the EOS Data Product Identification label of the Data Product containing the GLAS Data Element and the GLAS Data Parameter, obtained from the EOS Senior Project Scientist List of Data Products
Parameter Number	the unique GLAS Data Parameter identification number used to denote the collection or group of which the GLAS Data Element is a member
Description	a text description of the contents and discipline interest of the GLAS instrument or sensor data element
Minimum Value	the lowest representable value within the data element or the actual physical element minimum value based on the units configuration
Nominal Value	the routine expected value for the data element
Maximum Value	the largest representable value within the data element or the actual largest physical data element value based on the units configuration
Elements/Second	the number of times the GLAS Data Element is repeated in the record expressed as rate, per second (e.g., 5 for five elements per second)
Units	the output measurement units for the GLAS Data Element as it appears on the record in the data product (e.g., millimeters)
Items/Element	the number of data items (values) or arrays of values contained in the record for the GLAS Data Element (e.g., 2 for two items per element)
Precision	the required representation resolution of the least significant digit of the measurement for the GLAS Data Element value (e.g., 1 millisecond)
Bytes/Item	the size of each data item (value) contained in the GLAS Data Element, expressed in bytes

Appendix A
Level 2 Data Products
EOSDIS Standard Label
Contents & Description

To Be Provided

Appendix B
Level 2 Data Products
Format

To Be Provided

Appendix C

Level 2 Data Products

Detailed Contents and Description

<i>Element Name</i>	<i>Product Identification</i>	<i>Parameter Number</i>
<i>Description</i>		
<i>Minimum Value</i>	<i>Nominal Value</i>	<i>Maximum Value</i>
<i>Elements/Second</i>	<i>Units</i>	
<i>Items/Element</i>	<i>Precision</i>	
<i>Bytes/Item</i>		

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Aerosol Backscatter Cross Section Data	GLA05	2308B
Array of 532 nm aerosol backscatter data, covering approximately 40 kilometers, for each cross section. For each item, within the array, one byte is the mantissa and the second byte is the exponent. Valid data regions within each cross section are defined by the Aerosol Backscatter Cross Section Range element.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	5	Units:
Items/Element:	550	Precision:
Bytes/Item:	2.00	
Aerosol Backscatter Cross Section Horizontal Resolution	GLA05	2308B
The horizontal resolution of the 532 nm aerosol extinction cross section.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	1	Units:
Items/Element:	1	Precision:
Bytes/Item:	2.00	
Aerosol Backscatter Cross Section Quality Flag	GLA05	2308B
Data quality flag for the 532 nm aerosol backscatter cross section data; indicates backscatter data quality based on good vs. bad data criteria.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	1	Units:
Items/Element:	5	Precision:
Bytes/Item:	8.00	
Aerosol Backscatter Cross Section Range	GLA05	2308B

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Start and stop range values for up to 5 valid regions within each 532 nm aerosol backscatter cross section.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	km
Items/Element:	10	Precision:	
Bytes/Item:	4.00		

Aerosol Backscatter Cross Section Use Flag	GLA05	2308B
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Aerosol backscatter cross section data use flag showing discipline and coverage applicability for the 532 nm aerosol backscatter cross section data.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		

Aerosol Extinction Cross Section Data	GLA05	2308D
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The aerosol extinction data for approximately 30 km from the Cloud Absorption Cross Section Range. Calculated from the 532 nm data.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	400	Precision:	
Bytes/Item:	2.00		

Aerosol Extinction Cross Section Quality Flag	GLA05	2308D
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532 nm aerosol extinction cross section data quality flag; indicates data quality based on good vs. bad data criteria.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		

Aerosol Extinction Cross Section Use Flag	GLA05	2308D
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Data use flag showing discipline and coverage applicability for the 532 nm aerosol extinction cross section data.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Bytes/Item:	8.00		
Aerosol Measurement		GLA05	2308
Aerosol region depth.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	km
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Aerosol Optical Depth		GLA09	2291
Aerosol optical depth measurement.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Aerosol Optical Depth Quality Flag		GLA09	2291
Data quality flag for the aerosol optical depth; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Aerosol Optical Depth Use Flag		GLA09	2291
Aerosol optical depth use flag showing discipline and coverage applicability.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Boundary Layer Height		GLA05	1014
Referenced height of a planetary aerosol boundary layer, as derived from the aerosol structure.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Canopy Height	GLA11	3746
Height difference between the detected forest/vegetation canopy crown (top) return and the detected surface ground return.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	40	Units:
Items/Element:	1	Precision:
Bytes/Item:	4.00	
Canopy Quality Flag	GLA11	3746
Data quality flag for the vegetation canopy group indicates data quality based on good vs. bad criteria.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	1	Units:
Items/Element:	6	Precision:
Bytes/Item:	8.00	
Canopy Use Flag	GLA11	3746
The vegetation canopy group use flag showing discipline and coverage applicability; includes ice, aerosols, vegetation canopy, ice sheet or land topography interest, land/ice, land/ocean, ocean, deep water, clouds/boundary, land/vegetation.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	1	Units:
Items/Element:	6	Precision:
Bytes/Item:	8.00	
Cloud 1064 nm Backscatter Cross Section Data	GLA05	2308A
5 arrays consisting of 15 measurements of cloud backscatter for each cross section. Each array is for a cloud region covering 1 km. The start range for each region is contained in the Cloud 1064 nm Backscatter Cross Section Range element.		
Min/Nom/Max Value:	0.00	0.00
Element/Second:	40	Units:
Items/Element:	75	Precision:
Bytes/Item:	2.00	
Cloud 1064 nm Backscatter Cross Section Horizontal Resolution	GLA05	2308A
The horizontal resolution of the cross section.		
Min/Nom/Max Value:	0.00	0.00

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Element/Second:	1	Units:	km
Items/Element:	1	Precision:	
Bytes/Item:	2.00		
Cloud 1064 nm Backscatter Cross Section Quality Flag	GLA05	2308A	
Data quality flag for the cloud backscatter cross section data; indicates backscatter data quality based on good vs. bad data criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud 1064 nm Backscatter Cross Section Range	GLA05	2308A	
5 start ranges for each 1 km region within each cross section.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	km
Items/Element:	5	Precision:	
Bytes/Item:	4.00		
Cloud 1064 nm Backscatter Cross Section Use Flag	GLA05	2308A	
Cloud backscatter cross section data use flag showing discipline and coverage applicability.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud 532 nm Backscatter Cross Section Data	GLA05	2308E	
Array of calculated 532 nm cloud backscatter. The start range of the data within each element begins at the corresponding Cloud Absorption Cross Section Range.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	200	Precision:	
Bytes/Item:	4.00		
Cloud 532 nm Backscatter Cross Section Quality Flag	GLA05	2308E	
Data quality flag for the cloud backscatter cross section data; indicates backscatter data quality based on good vs. bad data criteria.			

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud 532 nm Backscatter Cross Section Use Flag	GLA05	2308E	
Cloud backscatter cross section data use flag showing discipline and coverage applicability.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Absorption Cross Section Data	GLA05	2308C	
Array of 532 nm cloud absorption cross section data. The data within each element begins at the corresponding start range of the Cloud Absorption Cross Section Range and covers the next 15 km.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	200	Precision:	
Bytes/Item:	4.00		
Cloud Absorption Cross Section Quality Flag	GLA05	2308C	
Data quality flag for the 532 nm cloud absorption cross section data; indicates absorption data quality based on good vs. bad data criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Absorption Cross Section Range	GLA05	2308C	
Range to start of cloud absorption cross section, cloud 532 nm cross section, and aerosol extinction cross section.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	km
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Cloud Absorption Cross Section Use Flag	GLA05	2308C	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

532 nm cloud absorption cross section data use flag showing discipline and coverage applicability.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Bottom		GLA06	1400
Center-of-mass referenced height of the bottom of a cirrus, thin, or dense cloud layer in the atmosphere.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Cloud Height Quality Flag		GLA06	1400
Data quality flag for the cloud height group; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Height Use Flag		GLA06	1400
Cloud height group use flag showing discipline and coverage applicability: ice, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Optical Depth		GLA09	2291
Cloud optical depth measurement.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Cloud Optical Depth Quality Flag		GLA09	2291
Data quality flag for the cloud optical depth; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Optical Depth Use Flag		GLA09	2291
Cloud optical depth use flag showing discipline and coverage applicability.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	5	Precision:	
Bytes/Item:	8.00		
Cloud Top		GLA06	1400
Center-of-mass referenced height of the top of a cirrus, thin, or dense cloud layer in the atmosphere.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Pulse Rate		GLA07	2912A
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Pulse Rate		GLA08	1554A
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	3	Precision:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Bytes/Item:	8.00		
Coordinate Data, POD, Pulse Rate		GLA10	2858
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Pulse Rate		GLA11	3746
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Pulse Rate		GLA05	2308A
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Quality Flag		GLA08	1554A
POD orbit quality flag.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA07	2912A
POD orbit quality flag.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA10	2858
Coordinate Data, POD, Quality Flag			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA11	3746
Coordinate Data, POD, Quality Flag			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA05	2308A
Coordinate Data, POD, Quality Flag			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA09	2291
POD orbit quality flag.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA06	1400
Coordinate Data, POD, Quality Flag			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Bytes/Item:	4.00		
Coordinate Data, POD, Quality Flag		GLA05	2308B
Coordinate Data, POD, Quality Flag			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Coordinate Data, POD, Sample Rate		GLA05	2308B
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 5 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Sample Rate		GLA06	1400
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 5 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Coordinate Data, POD, Sample Rate		GLA09	2291
Precision orbit determination of GLAS spacecraft coordinates in the IERS Terrestrial Reference Frame: east longitude, latitude, and spacecraft center of mass height, at the 5 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	5	Units:	
Items/Element:	3	Precision:	
Bytes/Item:	8.00		
Ice Sheet Elevation Quality Flag		GLA07	2912A
Data quality flag for the ice sheet elevation group; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Ice Sheet Roughness Quality Flag		GLA07	2912B
Data quality flag for the ice sheet roughness; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Ice Sheet Roughness Use Flag		GLA07	2912B
Ice sheet roughness use flag showing discipline and coverage applicability: ice, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Ice Sheet Surface Elevation		GLA07	2912A
Ice sheet surface height above the reference geoid, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Ice Sheet Surface Roughness		GLA07	2912B
Frequency and magnitude surface slope change parameter, describing the ice surface unevenness across the laser footprint.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Ice sheet Elevation Use Flag		GLA07	2912A
Ice sheet elevation group use flag showing discipline and coverage applicability: ice mass balance, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary, land/vegetation.			

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Land Elevation		GLA10	2858
The 40 hertz, along-track, land surface height above the reference geoid.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Land Elevation Correction, Atmosphere		GLA10	2858
Group atmospheric delay correction factor applied to the land surface reflectivity group; includes ionospheric, and wet and dry tropospheric delay correction factors. (NEED ONLY ONE OF Atmospheric, Laser pointing, and Calibration corrections for energy - regardless of location. WHICH?)			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Land Elevation Quality Flag		GLA10	2858
Data quality flag for the land topography; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Land Elevation Reflectivity Correction, Calibration		GLA10	2858
Correction factor applied to the land surface reflectivity group, based on instrument calibration and verification (SEE NOTE in Atmospheric correction description).			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Land Elevation Reflectivity Correction, Laser Pointing		GLA10	2858

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Per pulse correction applied to each derived laser pulse land surface reflectivity value in the 1-second group, based on the laser pointing angle at each pulse (SEE NOTE in atmospheric correction description).

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Land Elevation Reflectivity Correction, Retrack	GLA10	2858
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Per pulse correction applied to each derived laser pulse received energy value in the 1-second group, from retracking of the digitized laser waveform samples.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Land Elevation Reflectivity Correction, Solar Angle	GLA10	2858
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Solar radiance optical noise contribution correction factor, applied to the 1-second land surface reflectivity group.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Land Elevation Surface Reflectivity	GLA10	2858
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Ratio of the corrected received to the transmitted laser pulse energy as a measure of the land surface reflectivity.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Land Elevation Surface Roughness	GLA10	2858
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An indicator of the land surface unevenness across the laser spot footprint.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Bytes/Item:	4.00		
Land Elevation Use Flag		GLA10	2858
Land topography use flag showing discipline and coverage applicability: ice, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Orbit Number		GLA05	2308A
The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		
Orbit Number		GLA06	1400
The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		
Orbit Number		GLA08	1554A
The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		
Orbit Number		GLA09	2291

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		

Orbit Number	GLA10	2858
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The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		

Orbit Number	GLA07	2912A
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The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		

Orbit Number	GLA11	3746
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The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		

Orbit Number	GLA05	2308B
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The EOSDIS-assigned EOS ALT orbit reference number (obtained from EOSDIS library calls and EOS ephemeris data). Orbit numbers for 5+ years can be stored in 16 bits (as either signed or unsigned integer).

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	2.00		
Sea Ice Elevation		GLA08	1554B
Sea ice surface height above the reference geoid, at the 40 hertz rate.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Elevation Quality Flag		GLA08	1554B
Data quality flag for the sea ice elevation group; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Sea Ice Elevation Use Flag		GLA08	1554B
Sea ice elevation group use flag showing discipline and coverage applicability: ice mass balance, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary, land/vegetation.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Sea Ice Reflectivity Correction, Atmosphere		GLA08	1554A
Atmospheric delay correction factor applied to the ice sheet surface reflectivity group; includes ionospheric, and wet and dry tropospheric delay correction factors.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Reflectivity Correction, Calibration		GLA08	1554A

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Correction factor applied to the ice sheet surface reflectivity group, based on instrument calibration and verification.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Reflectivity Correction, Laser Pointing	GLA08	1554A	
Per-pulse energy correction applied to each derived laser pulse ice sheet surface reflectivity value in the 1-second group, based on the laser pointing angle at each pulse.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Reflectivity Correction, Solar Angle	GLA08	1554A	
Solar radiance optical noise contribution correction factor, applied to the 1-second ice sheet surface reflectivity group.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Roughness	GLA08	1554A	
Frequency and magnitude surface slope change parameter, describing the ice surface unevenness across the laser footprint.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Sea Ice Roughness Quality Flag	GLA08	1554A	
Data quality flag for the sea ice roughness group; indicates quality based on good vs. bad criteria.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Bytes/Item:	8.00		
Sea Ice Roughness Use Flag		GLA08	1554A
Sea ice roughness group use flag showing discipline and coverage applicability: ice mass balance, aerosols, vegetation canopy, ice sheet or land topography, land/ice, land/ocean, ocean, deep water, clouds/boundary, land/vegetation.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	6	Precision:	
Bytes/Item:	8.00		
Sea Ice Surface Reflectivity		GLA08	1554A
Ratio of the corrected received to the transmitted laser pulse energy, as a measure of the ice sheet surface reflectivity.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Time of First Pulse		GLA10	2858
The time tag of the first laser pulse in the 1-second data frame, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		
Time of First Pulse		GLA05	2308A
The time tag of the first sample, at the 5 Hertz data rate, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Pulse		GLA08	1554A
The time tag of the first laser pulse in the 1-second data frame, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Pulse		GLA07	2912A
The time tag of the first laser pulse in the 1-second data frame, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Pulse		GLA11	3746
The time tag of the first laser pulse in the 1-second data frame, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Sample		GLA06	1400
The time tag of the first sample, at the 5 Hertz data rate, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Sample		GLA09	2291
The time tag of the first sample, at the 5 Hertz data rate, corrected for system and transit delay, in CCSDS day segmented binary form.			
Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		
Time of First Sample		GLA05	2308B

Table C-1 GLAS LEVEL 2 DATA PRODUCTS -- DETAILED CONTENTS AND DESCRIPTION

The time tag of the first data sample at the 5 Hertz data rate, in CCSDS day segmented binary form.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	1	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	8.00		

Vegetation Density	GLA11	3746
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Indication of the apparent vegetation canopy closure based on energy spread and albedo spacing in the laser footprint.

Min/Nom/Max Value:	0.00	0.00	0.00
Element/Second:	40	Units:	
Items/Element:	1	Precision:	
Bytes/Item:	4.00		

Abbreviations & Acronyms

ALT	EOS-Altimeter spacecraft series
DAAC	Distributed Active Archive Center
ECS	EOSDIS Core System
EDOS	EOS Data and Operations System
EOC	EOS Operating Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
GDS	GLAS Ground Data System
GLAS	Geoscience Laser Altimeter System instrument or investigation
GPS	Global Positioning System
GSFC	NASA Goddard Space Flight Center at Greenbelt, Maryland
GSFC/WFF	NASA Goddard Space Flight Center/Wallops Flight Facility at Wallops Island, Virginia
HDF	Hierarchical Data Format
ID	Identification
IEEE	Institute for Electronics and Electrical Engineering
IST	GLAS Instrument Support Terminal
LASER	Light Amplification by Stimulated Emission of Radiation
LIDAR	Light Detection and Ranging
N/A	Not (/) Applicable
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
POD	Precision Orbit Determination
QA	Quality Assurance
SCF	GLAS investigation Science Computing Facility and workstation(s)
SDPS	Science Data Processing Segment
TBD	to be determined, to be done, or to be developed
UNIX	the operating system jointly developed by the AT&T Bell Laboratories and the University of California-Berkeley System Division

Glossary

aggregate	A collection, assemblage, or grouping of distinct data parts together to make a whole. It is generally used to indicate the grouping of GLAS data items, arrays, elements, and EOS parameters into a data record. For example, the collection of Level 1B EOS Data Parameters gathered to form a one-second Level 1B data record. It could be used to represent groupings of various GLAS data entities such as data items aggregated as an array, data items and arrays aggregated into a GLAS Data Element, GLAS Data Elements aggregated as an EOS Data Parameter, or EOS Data Parameters aggregated into a Data Product record.
array	An ordered arrangement of homogenous data items that may either be synchronous or asynchronous. An array of data items usually implies the ability to access individual data items or members of the array by an index. An array of GLAS data items might represent the three coordinates of a georeference location, a collection of values at a rate, or a collection of values describing an altimeter waveform.
file	A collection of data stored as records and terminated by a physical or logical end-of-file (EOF) marker. The term usually applies to the collection within a storage device or storage media such as a disk file or a tape file. Loosely employed it is used to indicate a collection of GLAS data records without a standard label. For the Level 1A Data Product, the file would constitute the collection of one-second Level 1A data records generated in the SDPS working storage for a single pass.
header	A text and/or binary label or information record, record set, or block, prefacing a data record, record set, or a file. A header usually contains identifying or descriptive information, and may sometimes be embedded within a record rather than attached as a prefix.
item	Specifically, a data item. A discrete, non-decomposable unit of data, usually a single word or value in a data record, or a single value from a data array. The representation of a single GLAS data value within a data array or a GLAS Data Element.
label	The text and/or binary information records, record set, block, header, or headers prefacing a data file or linked to a data file sufficient to form a labeled data product. A standard label may imply a standard data product. A label may consist of a single header as well as multiple headers and markers depending on the defining authority.
Level 0	The level designation applied to an EOS data product that consists of raw instrument data, recorded at the original resolution, in time order, with any duplicate or redundant data packets removed.
Level 1A	The level designation applied to an EOS data product that consists of reconstructed, unprocessed Level 0 instrument data, recorded at the full resolution with time referenced data records, in time order. The data are annotated with ancillary information including radiometric and geometric calibration coefficients, and georeferencing parameter data (i.e., ephemeris data). The included, computed coefficients and parameter data have not however been applied to correct the Level 0 instrument data contents.

Level 1B	The level designation applied to an EOS data product that consists of Level 1A data that have been radiometrically corrected, processed from raw data into sensor data units, and have been geolocated according to applied georeferencing data.
Level 2	The level designation applied to an EOS data product that consists of derived geophysical data values, recorded at the same resolution, time order, and georeference location as the Level 1A or Level 1B data.
Level 3	The level designation applied to an EOS data product that consists of geophysical data values derived from Level 1 or Level 2 data, recorded at a temporally or spatially resampled resolution.
Level 4	The level designation applied to an EOS data product that consists of data from modeled output or resultant analysis of lower level data that are not directly derived by the GLAS instrument and supplemental sensors.
metadata	The textual information supplied as supplemental, descriptive information to a data product. It may consist of fixed or variable length records of ASCII data describing files, records, parameters, elements, items, formats, etc., that may serve as catalog, data base, keyword/value, header, or label data. This data may be parsable and searchable by some tool or utility program.
orbit revolution	The passage of time and spacecraft travel signifying a complete journey around a celestial or terrestrial body. For GLAS and the EOS LASER ALT spacecraft each orbit revolution count starts at the time when the spacecraft is on the equator traveling toward the North Pole, continues through the equator crossing as the spacecraft ground track moves toward the South Pole, and terminates when the spacecraft has reached the equator moving northward from the South Polar region.
parameter	Specifically, an EOS Data Parameter. This is a defining, controlling, or constraining data unit associated with a EOS science community approved algorithm. It is identified by an EOS Parameter Number and Parameter Name. An EOS Data Parameter within the GLAS Data Product is composed of one or more GLAS Data Elements
pass	A sub-segment of an orbit, it may consist of the ascending or descending portion of an orbit (e.g., a descending pass would consist of the ground track segment beginning with the northernmost point of travel through the following southernmost point of travel), or the segment above or below the equator (e.g., either the northern or southern hemisphere portion of the ground track on any orbit).
product	Specifically, the Data Product or the EOS Data Product. This is implicitly the labeled data product or the data product as produced by software on the SDPS or SCF. A GLAS data product refers to the data file or record collection either prefaced with a product label or standard formatted data label or linked to a product label or standard formatted data label file. Loosely used, it may indicate a single pass file aggregation, or the entire set of product files contained in a data repository.
record	A specific organization or aggregate of data items. It represents the collection of EOS Data Parameters within a given time interval, such as a one-second data record. It is the first level decomposition of a product file.

Standard Data Product	Specifically, a GLAS Standard Data Product. It represents an EOS LASER ALT/GLAS Data Product produced on the EOSDIS SDPS for GLAS data product generation or within the GLAS Science Computing Facility using EOS science community approved algorithms. It is routinely produced and is intended to be archived in the EOSDIS data repository for EOS user community-wide access and retrieval.
variable	Usually a reference in a computer program to a storage location.

